THE MOTOR AGE

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THE WASHINGTON SHOW OPENS

AUSPICIOUS FIRST NIGHT OF THE AUTOMOBILE EXHIBITION AT THE NATIONAL CAPITAL—SOCIETY SHOWS A VERY MARKED INTEREST IN THE EVENT AND TURNS OUT IN FORCE

Washington, Dec. 10.—Good weather and a large attendance of interested people marked the opening of the National Automobile & Sportsman's Exhibition at Convention Hall on Monday night. The show will run the entire week, and, judging from the widespread popular interest manifested in the affair, it will be one of the most successful trade exhibitions ever given in this city. More than ordinary interest attaches to this show for the reason that it is the first time in the national capital that the automobile has had an adequate representation at a popular show. Very gratifying to the promoters and to the various exhibitors is the fact that the smart set, comprising diplomats, government officials of high degree and social leaders of national reputation have taken most kindly to what one of them termed the new "event" in the winter programme. Numerous box parties have been arranged for the week, and on Thursday night, when the floral parade takes place, the smart set will dominate everything. It

is this very desirable class of people that the exhibitors hope to interest in the newest things in automobile construction.

A Scene of Beauty

Crossing a bridge leading from the main entrance to the automobile exhibits, the spectators find a scene of beauty spread out before them. The vast roof of iron and glass is decorated with flags and bunting, great festoons of bunting being suspended from the giant trusses supporting the roof. Each one of these trusses—and there are nearly a hundred of them—is incrusted with incandescent electric lights, while huge arc lights suspended from the roof, throw additional light on the scene below.

A Track Too

Encircling the hall is an eighth of a mile board track of sufficient width to permit of two vehicles abreast, and while it is not banked on the turns, the operators are able to go around the track at a good rate of speed. The availability and general use of this track for demonstration purposes and for the various contests arranged for each evening promises to be the great feature of the show. For one thing it relieves the monotony of viewing motionless vehicles.

The Opening Night

On the opening night the track was full of vehicles moving along at the rate of eight miles an hour—the highest rate of speed allowed by the management—and the animated spectacle presented by the various machines in operation filled the spectators with admiration for the new mode of locomotion.

The automobile exhibits are arranged inside the track, while the other exhibits occupy the east side of the building. On the west side, on a raised floor, are located the boxes and reserved seats, from which an excellent view of the official trials and contests can be had.

A List of the Exhibitors

The following are the automobile exhibitors:

Woods Electric Vehicle Co.
American Bicycle Co.
Baltimore Automobile Co.
Baltimore Automobile Mfg. Co.
Capital City Storage Co.
Knox Automobile Co.
De Dion-Bouton Motorette Co.
Electric Vehicle Co.
Locomobile Co. of America.
Mobile Co. of America.
Overman Mfg. Co.
Riker Electric Vehicle Co.
Steffey Mfg. Co.

Among the other exhibitors are the following:

New York Belting & Packing Co.
Rose Mfg. Co.
Cleveland Cycle Co.
D. N. Walford.

A Scene of Animation

A scene full of endless animation and amusement during each evening of the show will be the brake and obstacle contests on the track between the various vehicles in their own classes and then all types together. All this will be new and interesting to Washingtonians.

New York to Washington

Among the expert chaffeurs in attendance at the show is C. J. Ridgway, of the De Dion-Bouton Motorette Co. He has on exhibiton a 5-horsepower Motorette in which he rode from New York to Washington, covering the distance in seventeen hours and fifty minutes actual riding time. He left New York on the morning of December 7, reaching Philadelphia 5¾ hours later. The most remarkable feature of his trip was the ride from Philadelphia to Baltimore, a distance of 123 miles, which he covered in eight hours without making a single stop.

Some Bad Roads

Owing to the bad state of the roads between Baltimore and this city, he had to ride the latter part of the trip at a slow rate of speed. Mr. Ridgway came through without a single accident and is the fifth person to make the continuous trip from New York to Washington. Speaking of the trip, he said:

Experiences Enroute

"I made many interesting observations from my machine as I sped along the various roads. Horses in the country as a rule were not frightened and showed less evidence of shying than the equines of the cities and their immediate suburbs. People whom I met driving in the rural districts, displayed no end of curiosity in my little machine. They forgot to attend to their reins and their

horses often carried them off the road. The country dogs, instead of remaining to bark as they do at cyclists, beat a hasty retreat on first sight of my vehicle. The entire trip was an enjoyable one."

The First Locomobile

Among the automobile exhibits is what must be regarded as a special exhibit in the first Locomobile built by the Stanleys. Contrasting this primitive machine with the latest models, one is forcibly impressed with the wonderful strides that have been made in automobile manufacture within the past few years.

Stimulates Local Interest

There is no doubt but what the show now in progress will have the effect of greatly stimulating local interest in the automobile question. Those who closely watch the trend of affairs have become convinced that there is no method of education combining that of commercial and general character, which is more practical and far-reaching in its influence and benefits than that of an exhibition, such as that now in progress here. Intermingling with people from various parts of the country, exchanging ideas, examining other lines, investigating other business methods, all tends to broaden and stimulate commercial activity.

Washington a Good City

As a field for the sale of automobiles, Washington is second to no other city in the country. It has over 200 miles of wide, smooth streets, and good highways radiate from the city in every direction. It is the abode of wealth and culture. Rich men and women from all parts of the country have houses in Washington, where they spend at least a portion of the year. In truth, the national capital is the embodiment of the aristocratic life of the country. Into the city come all the socially ambitious who feel that in this cosmopolitan center they can accomplish more than in their native cities. It is this class of people who are interested in the automobile.

THE RIKER COMPANY ABSORBED

New York, Dec. 8.—Thursday saw the consummation of another gigantic stride in the extension of the Electric Vehicle Co.'s holdings of electric automobile stock through an election of new officers marking its purchase and entire control of the Riker Motor Vehicle Co. of Elizabethport, N. J. Rumors of a gigantic electric vehicle trust have followed, which have mentioned as possible members of the great combination about all of the automobile companies using electricity as a motive power. These rumors are, of course, natural, but your correspondent has been unable to run them to any better source than mere nods and winks of some men in the trade, who perhaps may have an opportunity to know something.

How complete is the consolidation of the two interests and how evenly distributed have been the offices may be judged from the ticket elected. George H. Day, former vice-president of the Columbia Electric Vehicle Co., president, former Pres. R. McA. Lloyd retiring to the directorate; F. C. Stevens, president of the Metropolitan Street Railway Co. of Washington, D. C., and former president of the Riker Motor Vehicle Co., also becoming a director; H. M. Byllesby, former first vice-president of the Riker Motor Vehicle Co., first vice-president; W. H. Johnson, former general manager of the Electric Vehicle Co., second vice-president; A. L. Riker, second vice-president of the Riker Motor Vehicle Co., third vice-president; T. W. Goodridge, secretary; Frederick Viewig, treasurer. The directors in addition to those mentioned above and embracing the president and vice presidents elected were George Chapman, business representative of John Jacob Astor, who retired; P. T.

Dodge, Herbert Lloyd, Martin Maloney, Col. A. A. Pope, T. J. Regan, Isaac L. Rice and Daniel H. Shea.

A resume of the history of the Electric Vehicle Co. and a statement of its successive increases of capital and acquirements of additional properties are of interest at this time as showing the great extent of its influence in electric automobilism in this country and its progress toward a possible future gigantic trust.

The Electric Vehicle Co. was incorporated September 27, 1897, under New Jersey laws, with ten millions capital, equally divided between common and preferred stock. On May 3, 1899, the common stock was increased $2,000,000. On June 20 of this year, on the purchase of the Columbia Electric and Vehicle Co.'s balance of stock, there was a further increase of $6,000,000, equally divided between the common and the preferred. So at the time of the purchase of the Riker Motor Vehicle Co. its total capital was $18,000,000, made up of ten millions common and eight millions 8 per cent preferred.

Since its incorporation the Electric Vehicle Co. has absorbed, either directly or through companies themselves owning them, the following companies: Columbia Electric and Vehicle Co., Columbia Automobile Co., New Haven Carriage Co., Siemans & Halska Electric Mfg. Co. of Chicago, Electric Carriage and Wagon Co., Electric Storage Battery Co., Derby Lead Co. and New York Electric Vehicle Transportation Co. Through the last named it owns five local subcompanies, all bearing the title Electric Vehicle and Transportation Co., with the prefixes New England, Pennsylvania, Illinois, Washington and Mexican.

The Riker Electric Vehicle Co. was incorporated January 15, 1899, with $2,000,000 of 6 per cent preferred stock and $5,000,000 common. On March 31, 1900, it had its name changed to the Riker Motor Vehicle Co.

The Electric Vehicle Co. also purchased from Mr. Riker all his foreign patents, and now under the new deal, according to Mr. Riker, claims to control all the electric vehicle patents of commercial value, a rather exaggerated assumption, to say the least. It also claims ownership of the basic patents for running gear and is now seeking in the courts to prove that the Selden patent, owned by it, is a basic patent in gasolene vehicle construction.

First Vice President Byllesby confirmed the substantial details of the above in an interview with The Motor Age representative.

The Electric Vehicle Co. is recognized as under the control of the so-called Whitney-Widener-Elkins street railway syndicate.

With the New York Central crowd and the Vanderbilts in practical control of the Woods Electric Vehicle Co., the relations of these syndicates to one another in the electric automobile game would be an interesting story.

WEEKLY PATENT OFFICE BUDGET

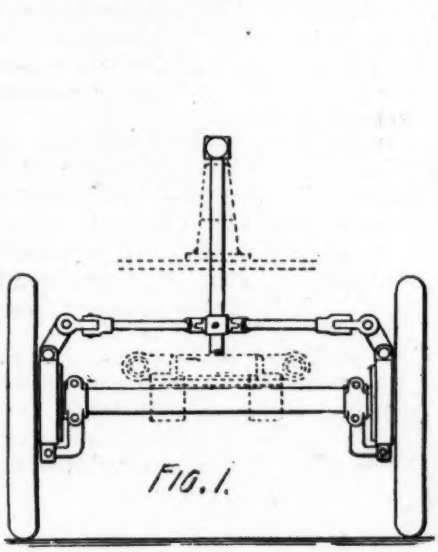
A NUMBER OF PATENTS OF MORE THAN COMMON INGENUITY AND MERIT—THE ADAMS EXPRESS CO.'S MECHANICAL EXPERT AND A WELL-KNOWN WRITER FIGURE AS PATENTEES.

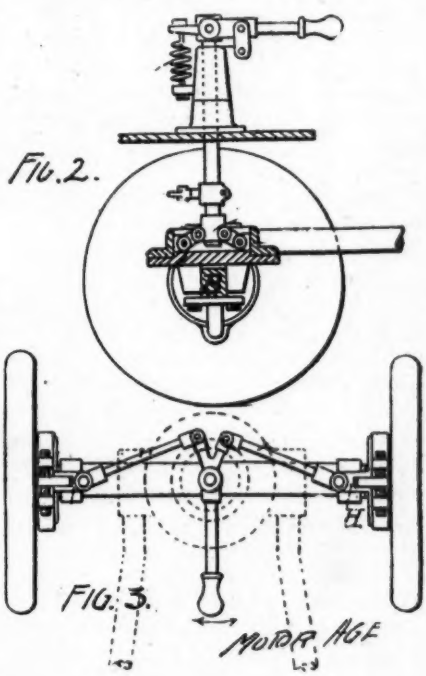
The following summary of patents covers, briefly, several devices of great ingenuity and some merit, at least. How much it is difficult to say. Other devices are worse than useless and are treated as briefly as possible. Among the patentees figure Arthur Hirschmann, the mechanical expert of the Adams Express Co., who are giving particular attention to the automobile movement, and H. L. Arnold, the well-known writer on mechanical subjects.

The complete specification, claims and drawings of any patent will be furnished by the patent office at Washington for five cents per copy. Persons sending for copies of patents should address their letters "Commissioner of Patents, Washington, D. C.," and should inclose five cents for each copy of each patent desired and should state the numbers and dates of the patents. Each patent described in The Motor Age is preceded by its number and date.

LUNDQVIST'S STEERING MECHANISM

Letters patent, No. 663,350, to Emil Lundqvist, Berlin, Germany, assignor of one-half to Sigmund Bergmann, same place; steering and breaking mechanism for automobiles; nineteen claims allowed.



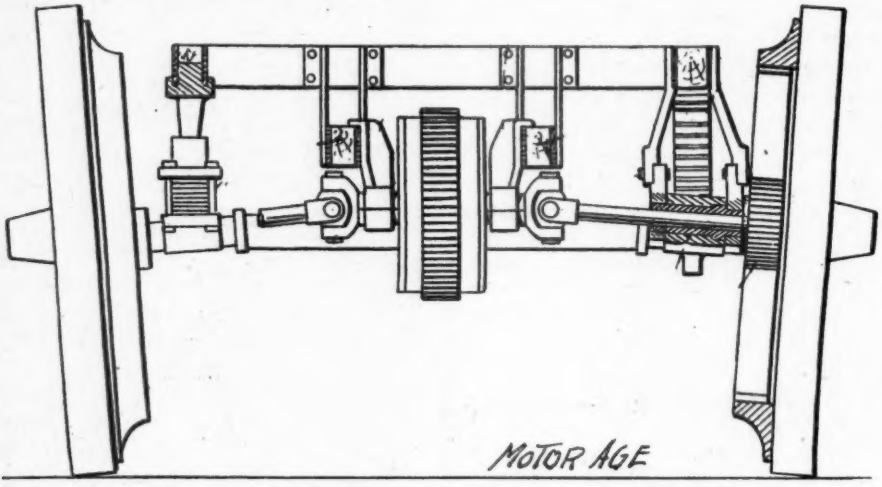


LUNDQVIST'S STEERING AND BRAKING MECHANISM

Mr. Lundqvist's device is certainly very ingenious, but does not appear, at first sight, to have any practical value, although worse looking devices than this have proven to have merit. The inventor has a vehicle in which the front axle

carries a fifth wheel, similar to those employed in horse-drawn vehicles. By applying a band brake to one or the other of these front wheels its motion is retarded, the axle is turned and the vehicle changes its direction. Normally a frictor clutch holds the fifth wheel in a rigid position, but when the steering lever is moved in a certain direction this clutch is released and the axle is at liberty to turn. Provision is also made so that, by a certain movement of the steering lever, the clutch remains in engagement and a band brake is applied to each of the front wheels, in which case the entire mechanism acts as a brake to the vehicle.

The inventor argues, in favor of his device, that it requires little exertion on the part of the driver to operate it, while in the usual forms main strength is required.



HERSCHMANN'S STEAM TRUCK

HERSCHMANN'S STEAM TRUCK

Letters patent, No. 662,029, dated December 4, 1900, to Arthur Herschmann, New York City, assignor to L. C. Weir, same place; motor mounting and running gear and transmission construction; *four claims allowed.*

Mr. Herschmann is the mechanical expert of the Adams Express Co., and at the instigation of his company has been investigating the motor vehicle problem, with a view to ascertaining the adaptability of self-propelled vehicles to the business of the company all over the United States. The influence of the general adoption of the automobile by a company of this magnitude would be immense.

Mr. Herschmann has radical ideas as to the kind of vehicle that should be used for the transportation of heavy merchandise, some of which are shown in the patent specification. The patentee, however, has evidently failed to get allowance for a number of claims which were probably in the original application. One thing that is covered is the method of hanging the engine, which is hung by two points on its upper side and one on its lower side, to allow the engine to accommodate itself to the twisting of the vehicle frame.

The most notable feature, however, is the manner in which the wheels are set. The accompanying illustration shows a rear elevation of the vehicle, parts being broken away. It will be seen that the wheels are dished and that the two ends of the rear axle are not in the same plane. This makes it necessary to transmit the power to the wheels in some other manner than through the rear axle. Accordingly the wheels are provided with internally-toothed gears. Pinions mesh with these gears and the pinions are on the two ends of a flexible, split shaft, which is provided at its center

with the usual differential gear and with a universal joint at either side of this differential gear, all of which is shown in the illustration.

The importance of the wheel construction shown for heavy vehicles is too well understood to require comment. In his method of transmitting the power to wheels so mounted Mr. Herschmann appears to have secured strong claims.

STRICKLAND'S STEERING DEVICE

Letters patent, No. 662,475, dated November 27, 1900, to Arthur Strickland, Hamilton, Canada; steering device for automobiles; three claims allowed.

Mr. Strickland has evolved an ingenious device, but as to whether or not it is of practical value is another question. It certainly is not strongly covered by the three claims allowed. Briefly, the device consists of the usual form of steering gear, somewhat complicated, with a revolvable sleeve surrounding the steering lever, the lower end of which sleeve operates the brakes on drums on the rear wheels while the upper end is provided with a lever, to be actuated by the foot. The surrounding sleeve is held in a split bushing. A reproduction of any portion of the patent office drawings would not add to the value of this description.

ARNOLD'S TRANSMISSION GEAR

Letters patent, No. 662,902, to H. L. Arnold, New York City, assignor to John A. Hill, same place; transmission and controlling mechanism; twenty-four claims allowed.

Mr. Arnold is a well-known mechanic and constructor and has been interested in the progress of automobilism for a long time. He is, perhaps, best known by his nom de guerre of Hugh Dolnar, under which pseudonym he has been a frequent contributor to the technical press of this country and Great Britain.

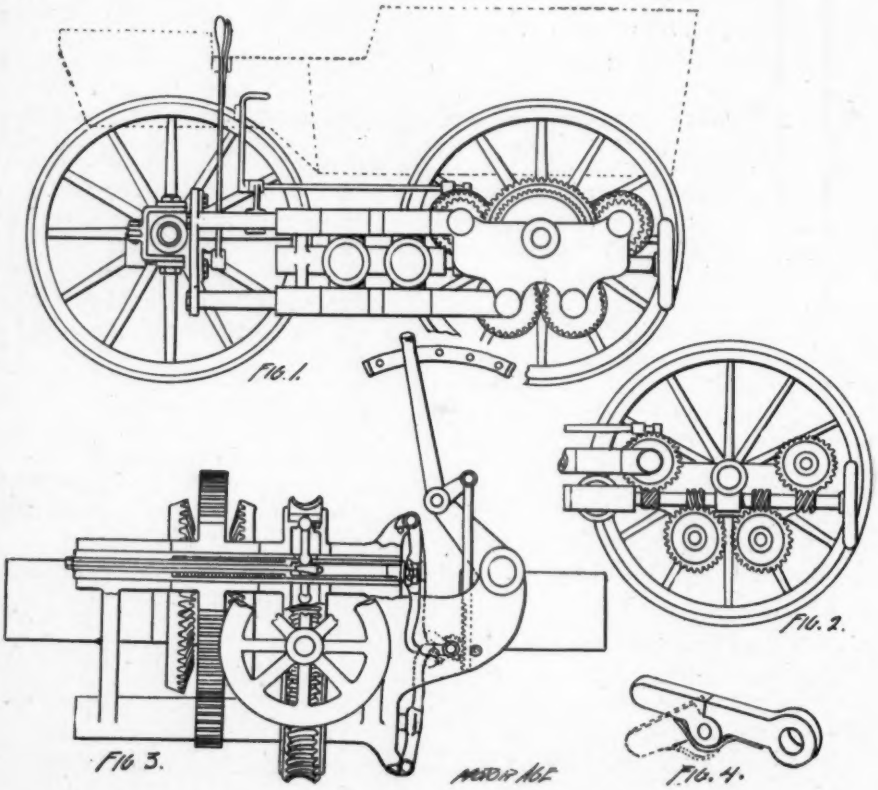
The present invention relates only to transmission mechanism, although it is understood that the inventor has a number of other patents in the patent office covering improvements in steam engines designed for automobile use.

In the drawings shown in his present patent the cylinders of the steam engine are placed transversely of the vehicle and about central of it, and the motor shaft, consequently, longitudinally of the vehicle. On the rearward end of this motor shaft are four spiral pinions which are integral with the shaft, and meshing with these spiral pinions are four spiral gears, two above the motor shaft and two below. These spiral gears are loosely mounted on their respective counter shafts. Within each of these gears is an expanding clutch member and any one of these expanding clutch members can be thrown into engagement by means of a single lever, but only one can be thrown in at a time. The power is transmitted by a train of gears to the differential gear of the rear axle of the vehicle. Three of the spiral pinions have a right-hand inclination and the fourth a left-hand inclination, so that the three will drive the vehicle in a forward direction and the fourth in a backward direction.

The expanding clutches are each actuated by a rod which is acted upon by fingers on a shaft operated by a hand lever. Supposing that the vehicle is at rest, the hand lever is moved in one direction and the vehicle is given its slow forward speed; a further movement of the lever in the same direction gives the vehicle its second sped and a still further movement gives it its third speed. To release the power, it is not necessary to pass from the high speed to the intermediate and slow, as the fingers operating the clutches which give the intermediate and slow speed are jointed in such a manner that they will be rigid only when moved in one direction and will give when power is applied in the other direction, the same as the human digit. The entire mechanism is highly ingenious and does credit to the inventive skill of the patentee, although it appears somewhat complicated on paper. This appearance of complication, however, may have been intentional, as it frequently is in patent-office drawings. The mechanism is, nevertheless, entirely capable of performing all the functions which are claimed for it, and capable of performing them positively.

In the accompanying illustrations Fig.

1 shows a side elevation of Arnold's vehicle with the near wheels and part of the mechanism removed; Fig. 2 shows the arrangement of the spiral pinions and gears; Fig. 3 shows one of the expanding clutches, the differential gear and the controlling lever and other parts of the mechanism, and Fig. 4 shows one of the jointed fingers for actuating the slow and medium speed clutches, the dotted lines indicating the bending of the finger when the lever to which it is attached is moved from the highest speed point to the disengagement point or to the reverse speed point.



ARNOLD'S CONTROLLING AND TRANSMISSION MECHANISM

ALLEN AND DANFORTH'S MECHANISM

Letters patent, No. 662,381, dated December 4, 1900, to Frederick E. Allen, Boston, and Raymond H. Danforth, Salem, Mass., assignors to the Improvements Mfg. Co., Boston, Mass.; automobile steering mechanism; three claims allowed.

This device is ingenious and looks as if it would perform its duty in the manner in which it is designed to do it.

In the accompanying drawings Fig. 1 represents a plan view of the steering arrangements, Fig. 2 a side elevation and Fig. 3 a reverse plan view of this mechanism.

Referring to the drawings, 1 1 represent the steering wheels of a vehicle, being mounted upon knuckles or steering spindles 2 2, which are journaled at the ends of a cross-frame or axle 3.

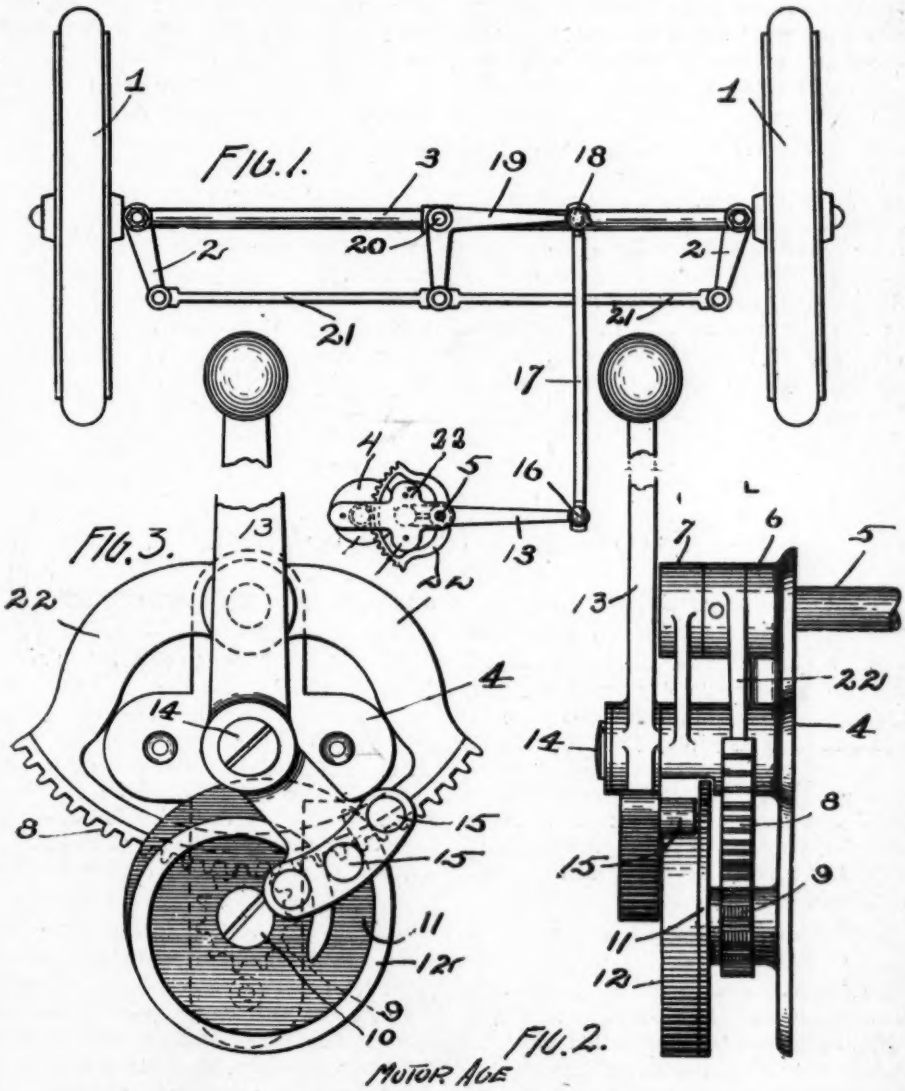
4 represents a base plate adapted to be attached to the body of the vehicle. This base in the arrangement shown in Fig. 1 would be attached to the vehicle body.

5 is a stem or spindle journaled in bearings 6 7 on the base plate 4, and

adapted to be connected at its upper end with the steering lever.

8 is a spur-gear segment keyed to the spindle 5, and 9 is a spur-pinion meshing with said segment and journaled on a stud 10 on a base plate.

from it at a distance from the pivot 14 and engaged by the thread 12 of the cam. The lever 13 is connected at its outer end by a universal joint 16 with a link or rod 17, attached at its other end by a universal joint 18 with one arm of a bell crank



ALLEN AND DANFORTH'S STEERING MECHANISM

11 is a flat cam attached to the pinion 9 and having on its under face a spiral or scroll thread 12.

13 is an oscillatory arm pivoted on a stud 14 on the base plate 4 and having a series of studs or teeth 15 15 projecting

or bent lever 19, which is pivoted at 20 to the cross frame 3. The other arm of said lever 19 is connected by links 21 21 with the steering knuckles 2 2.

The gear segment 8 is of considerably larger radius than the pinion 9, so that

when the pintle 5 is rotated through a relatively small arc one or more complete revolutions will be given to the cam 12. The thread of this cam, acting on the teeth 15 of lever 13, will oscillate the lever on its pivot, which oscillatory movement will be transmitted by the described connections to the steering-wheels, causing the latter to turn in one direction or the other and guide the vehicle. The arc of movement of the teeth 15 is very nearly normal to the thread 12 and the lever 13 is accordingly locked when the cam 11 is stationary, thus locking the steering wheels and preventing them from reversing or twisting out of their course, due to irregularities in the road. The perimeter of the segment 8 is attached by two arms 22 22 with the hub of this segment, and the inner edges of these arms act as stops which co-operate with the base of the stud 14, on which the lever 13 is pivoted, in limiting the movement of the segment, and hence of the steering wheels, in either direction.

OTHER PATENTS

Letters patent, No. 663,104, dated December 4, 1900, to Hans C. P. Silversleth, Copenhagen, Denmark; rubber vehicle tire; one claim allowed. The patent covers a device for running bolts through the rubber tire and the felly of a vehicle wheel, for what purpose the reader must determine for himself.

Letters patent, No. 663,175, dated December 4, 1900, to Thomas J. Ketcham, Matamoras, Pa.; wheel and tire; four claims allowed. This device is one of the multitudinous arrangements whereby inventors hope to replace the rubber tire by some sort of spring arrangement. Like the others, it is a failure on its face.

CUSTOM AND THE AUTOMOBILE

If the horseless carriage, like the poor and the single tax agitation, we are to have "always with us," it is to be hoped that we shall some day cease to miss the horse. That, though, cannot come about until some genius shall invent and persuade us to accept such forms of the new vehicle as will enable us to forget him. But in order to do that we must forget the vehicle that he drew—that is to say, we must have a vehicle whose difference from the old one consists in something more than its horselessness. Nearly every part of the one that we have has been constructed with direct or indirect reference to the animal that used to pull it, and fond recollection presents him to view as still pulling it.

Divorced from him it looks bereft, uncomfortable and helpless. It offends the eye, shocks our sense of the fitness of things and is a sore trial to the spirit generally. Probably, though, its horse-born features will remain in evidence for centuries after their origin is forgotten. Posterity will regard them as essential parts of the automatic scheme—will feel (for example) that without a "dashboard" the thing could not be made to go.

It requires generations for us to learn how best to do a new trick evolved from an old one. You shall not cast your eyes anywhere among the works of man without their resting on some "survival"—something that once had a purpose and a meaning, but has long ceased to have either, and is perpetuated by nothing but a stupid, unreasoning conservatism—a habit of continuing to do what has always been done.

I could fill this entire newspaper with instances in point. Why have so many buildings watch-towers without watchmen, battlements from which to fight no battle, bastions loopholed for archers, and so forth? Go into a cemetery and observe the number of marble, granite and bronze "urns."

When cremation was the rule (most of us think it is a new fashion), real urns were used to hold the ashes of the dead.

There are ashes no more, but the urns are there all right, and in explanation we say they are symbols. That word "symbol"—what a multitude of stupidities it covers! Today a convenience, tomorrow a superfluity, the next day a symbol—such are the genesis and development of things most precious to the sentiments. But the days are ages long.

Not all survivals are "symbolic;" only such as touch the sentiments. Most are merely nuisances; but we go on making the thing, or doing the act, as diligently and gravely as if it were needful. The merchant vessel of today is frequently painted to look like a warship with portholes for cannon. That is to scare away the pirates. The pirates have all left the high seas and gone into business on land, but that makes no difference; the traditions of the ship painting art require the dummy portholes.

Did you ever see an actor open a letter on the stage? He probably struck it a smart blow with the tips of his fingers. That was to free it from the sand which fifty years ago was used to "blot" letters, and some of which would stick to the wet ink. The actor never heard of the custom, but he taps the letter just as if he knew why.

Why do we bow? To show deference. Yes; but how does bowing show deference any better than lifting the foot or turning down the thumb? When one of our savage ancestors met another child of nature to whom he wished to be gracious he bent his head before him by way of saying: "See how I trust you! Cut it off if you want to." We have inherited the habit—it is a "survival." So is the handshake; the primeval gentleman showed his good will and good breeding (both always open to suspicion) by delivering his weapon hand into the keeping of the other person, who responded with his own.

Why does your tailor sew two buttons on the back of your frock coat? To sustain your sword belt—and you would not take the coat without them.

In England and several other European countries the railway coach is still so made and painted as to resemble three stage coaches in line. Why? Because in the mindlets of the first builders of railway coaches that form was associated with the most rapid locomotion they knew about and with the carrying of passengers.

The builder of today has not ventured to alter it lest some appalling calamity befall. It cannot be too often repeated that man is of an intelligence but little inferior to that of the gods. He made the gods.

So we shall doubtless have the automobile for a few centuries without material change of form—that is to say, crying out audibly for the horse. It is rather a pity, for it offers great opportunities to the artist. It could be made beautiful exceedingly.

I have no designs to submit for rejection, further than to suggest a study of the prow of a Greek galley, or a Venetian gondola, with a view to emancipation from the hideous "dashboard."—Ambrose Bierce in the New York Journal.

THE DESIGN OF WHEELS

"The wheel has not unreasonably been claimed to be the greatest of human inventions," said the late A. M. Wellington in one of his characteristic editorials, many years ago, according to the Engineering News. One needs only to reflect that practically all transportation by land is now and has been for centuries past dependent on the wheel to perceive the forcefulness of this statement. Without the aid of the wheel burdens could be carried only on the backs of animals or moved by dragging, and at correspondingly great expenditure of power. Such methods suffice for nomadic tribes. The North American Indians, for example, never had other means of transport than their ponies' backs and their dragging lodge poles, even when they inhabited a level, treeless country, where wheeled vehicles could have been readily used. When the change to a pastoral life was made, however, in the early dawn of civilization, the need was felt of better means of transport. The simple idea of cutting two disks off the end of a round tree trunk and thrusting a straight stick through their centers to serve as an axle was doubtless developed independently by many different tribes and races. This may be accepted as the most probable manner in which the first invention of the wheel was made, although the actual facts, both as to this and the later development of the built-up wheel, are lost in the mists that surround the early development of the race.

The wheel, then, with all its parts—hub, spokes, felloe and tire—was developed long prior to the advent of the engineer. Its organs were fashioned and adapted to their respective work with little idea in the mind of the artisan as to the nature and character of the stresses to be sustained. It represents one of the most remarkable examples extant of the work of evolution as applied to mechanical development. The engineer of to-day may apply his most careful and searching analysis to the structure which uncounted generations of wheelwrights have developed, and when he completes his task he can suggest no improvement upon the wheel they have made so long as it is confined to the duty it was designed to do and has done for so many centuries.

Within recent years, however, a new element has come into the wheel problem, and that is the design of wheels for self-moving vehicles. Builders of traction engines have been struggling with this problem for many years, but their difficulties did not attract much attention, and it was not until the bicycle came to be designed that the new element in the wheel problem came to general notice.

The wood spoke wheel, as ordinarily made for carriages, is wholly unsuited to withstand such strains as would be brought upon it by making it fast on its axle and applying a rotating force to the latter. Such a force sets up bending stresses in all the spokes, tending to break them off close to the hub. More important even than this in bicycle design, however, was the problem of making a very light wheel of very large diameter, such as was used on the old high-wheel bicycle or "ordinary," which was the first really successful vehicle for self-propulsion.

The old wooden wheel was unsuited to this for several reasons: First, the "dish" of the wheel had to be sacrificed, and with it a large part of the wheel's strength and stiffness. Second, the very small spokes necessary for lightness in so large a wheel became so long and slender that they were very weak as compression members. Third, the size of felloe and tire necessary to receive wooden spokes made the wheel too heavy.

It was to meet these conditions that the present well-known type of bicycle wheel, with its tension spokes of steel wire, was designed; and it was an ad-

mirable adaptation of means to ends. So strong a hold did it take on popular favor that when the high-wheel was displaced by the "safety," or present type of bicycle, the suspension wheel was retained, and it has been extensively adopted since on light horse-drawn vehicles. Whenever it has been attempted to place any considerable loads on wheels of this class, however, or to use them on rough roads or without the protection of the shock-absorbing pneumatic tire, their weakness has become at once apparent.

Those who have given most study to the motor-vehicle development acknowledge that one of the most important problems to-day is what type of wheel shall be used. The imperfections of existing types are coming to be recognized and there are few more inviting problems to the inventor than the study of the question how materials can best be fashioned to form a wheel suited to the demands of the present day. It may be of interest, therefore, to consider some of the conditions that should be borne in mind by those who would solve this problem.

In the first place, it is to be noted that timber suitable for wooden wheel construction is every year becoming more scarce and expensive. American carriages have become noted the world over for their remarkable combination of lightness and strength. But this is in great part due to the stores of hickory which have been available. If we are rightly informed, the stock of straight-grained hickory timber in the United States is rapidly dwindling. Wagon and carriage builders in the North and East have for years been procuring their supplies in the forests of Arkansas. When this is exhausted what shall take its place? Even if we grant that other supplies will be found and that other woods will be utilized, it still remains reasonably certain that the cost of good wooden wheels is bound to increase, and there is the more incentive, therefore, for those who would develop a metal wheel construction.

The great difficulty which must be surmounted by the successful designer of a metal wheel is the provision of elasticity. It is an easy matter to design a metal wheel which shall sustain a heavy static load, or one which shall move over a smooth surface; but to provide a wheel which shall absorb the shocks due to passing over an obstacle at good speed, and do it without the aid of a pneumatic or rubber tire—in short, to do the work which millions of wooden wheels are daily performing—that is the task which no designer of metal wheels has yet accomplished.

As many of our readers may not understand the manner in which a wooden wheel acts to absorb shock, we reprint herewith the following admirable explanation from a paper before the recent International Automobile Congress:

By dish is meant the inclination of the spokes to the exterior plane of the rim or of the normal plane to the center line of the spindle. This dish (in wheels with simule dish) is practically balanced by the "carrossage," the inclination of the spindle to the center line of the axle. It results from this that the lowest spoke of the wheel is very nearly vertical on horizontal ground.

The object of dishing the wheels is to give them more elasticity and more strength. The dish has the effect of transforming the spokes into just so many springs, rigidly connected to each other and subjected to bending stresses; it makes of the wheels a conical surface, capable of being slightly deformed in an elastic manner, and which has, therefore, a certain flexibility, which it would not have if the wheel had the form of a plane. In the last case the spokes would work solely under compression and successively in such a manner that all elasticity disappears. For wheels elasticity is one of the most important features; they are continually subjected to violent shocks from the ground and from the axle. If they were of a single piece and devoid of elasticity the shocks would deform them little by little and would finish by destroying them entirely, while if the shocks are divided over several pieces possessing a certain flexibility their destructive effect is considerably reduced. As the points struck may give a certain amount under the influence of the speed impressed by the body causing the shock, the pressure at any moment is much feebler than it would be in the case of a shock against a non-elastic body, and its effects are much attenuated. On the contrary, in a non-elastic roller in a single piece the diameter of the box increases rapidly as a result of these same shocks and the box is rapidly rendered useless. From what we have

said it follows that absolutely rigid wheels are not very suitable for vehicles intended to run at fast speeds. Thus it has also been found that wood wheels with double dish (double rows of spokes, as in bicycle wheels), good for heavy transport vehicles, which are drawn at a walk on smooth roads, get very rapidly out of shape if employed on vehicles drawn at a trot and on slightly rough roads. It has been the same with wheels of two rows of spokes all inclined in the same direction, but with a different dish for the two sets, which the English employed at the beginning of the century, and which gave them bad results. None of these wheels are applicable to automobiles except if they are provided with elastic tires, and preferably pneumatic tires.

We might make an exception, however, of the metallic wheels constructed and assembled like wooden wheels, and which have consequently a certain elasticity, if these wheels did not have other disadvantages from the standpoint of their use on automobiles.

The dish which gives the wheels their elasticity, which is really an indispensable quality, also gives them the strength necessary for transportation on rough roads. The conical form which the dish gives to the assemblage of the spokes solidarizes them, one with another, and forces them to work together, which they would not do if they were in the same plane. On the other hand, their same conical form is the cause that the different parts always work in the same direction, the same face of a spoke resting always on the same face of the hub, and on the same face of the rim, the pressure being always in the same direction. Contrarily, nothing is more unfavorable to the conservation of the wheels than having to undergo strains, which come alternately from the two opposite directions, which would be the case with a flat wheel. The hub can in no case pass from the inside to the outside of the wheel. It results from this, that if the vehicle receives a lateral shock, or runs on a ground inclined in the direction of the axles, one of the wheels is always working in a direction in which it is impossible for it to give. Under these circumstances, two flat wheels have less strength than the one dished wheel which works in the direction favorable to strength, as both offer but small resistance to lateral forces which tend to force the hubs outwardly.

The correctness of the above statement as to the elasticity produced by the dish of a wooden wheel can be tested by any one. Take hold of a carriage wheel and push vigorously against its rim or strike it a blow. It will yield like a very stiff spring. The solid wheel has no such elasticity, and must be protected by a yielding tire or it will be pounded to pieces. Perhaps it may be said that the tire is to be relied on for elasticity in the wheel of the future; but this, again, seems doubtful. The pneumatic tire is a success for bicycles and light pleasure vehicles, but it is a most expensive adjunct both in first cost and cost of maintenance. It is a good deal of a nuisance, being the most fruitful source of breakdowns wherever it is used, and for heavy vehicles it is quite out of the question. Another prominent disadvantage of the pneumatic tire is that it tends to limit the diameter of the wheels. It is, indeed, more difficult anyway to design a successful metal wheel of large diameter than one of small diameter; yet there is and will continue to be, a demand for good-sized wheels. Even in pleasure vehicles there are some reasons for raising the body of the vehicle out of the dust of the roadway, and when it comes to moving a vehicle over rough roads or over soft roads covered with mud or sand, the large wheels have an advantage which should not be forgotten.

As painted out above, the tension-spoke wheel naturally suggests itself when the design of large wheels is attempted; and it may be worth while to explain the causes of the weakness of tension-spoke wheels, to which allusion has already been made. In the ordinary wooden wheel, the spokes are all under compression, and the weight on the axle is carried straight down to the ground by that spoke which is vertically beneath the hub. In the tension-spoke wheel, of which the bicycle wheel is a familiar example, the weight on the axle is carried to the top of the wheel and has to be transmitted all the way around the rim to the point diametrically opposite, where the rim is supported by the ground. The stresses in the rim may be likened to those in two very slender semi-circular arches, which are held from deformation by the pull of spokes. The fact that the rim and not the spokes is the weak part of the tension-spoke wheel was hardly realized in the early

days of bicycle manufacture, and it was not until the failure of the light steel rim used on some of the early wheels that the stiffer and heavier wooden rim, with its greater resilience to absorb shocks, was substituted in its place.

From the above analysis, it will be seen at once how the difficulties thicken in the way of securing sufficient strength of rim, as the diameter of a tension-spoke wheel is increased. In fact, the rim soon becomes so large as to make the wheel unsightly, and even then it is notably deficient in strength and elasticity to resist shocks due to passage over obstacles, and the lateral stresses which every four-wheeled vehicle imparts to its supports, but which are entirely absent in the bicycle.

So far as can be seen, then, compression spokes must be a feature of a successful wheel for motor vehicles. If they can transmit tension as well, so much the better, or possibly a combination of tension spokes with them may be advantageous. The wheel, with purely tension spokes, however, is so inherently defective that it ought to be discarded by motor-vehicle builders, and, in fact, has already been discarded in many instances.

We have alluded above to the necessity of making the wheel itself sufficiently elastic to absorb without injury the shocks and jars of rough and rapid service. It is doubtless here that designers of metal wheels for motor vehicle service will meet their chief difficulty. The quality desired is resilience—the power of absorbing shock. It has been pointed out in these columns that modern methods of testing materials are deficient in that no accurate method of determining elastic resilience, or the inch-pounds of work per cubic inch of volume that different materials can absorb, has ever been introduced. It is to be hoped that some of the new tension impact testing machines which have recently been developed in this country may successfully solve this problem and give to engineering designers more accurate knowledge concerning this important property of the materials used in construction.

At present it can only be said that hickory has probably considerably more elastic resilience per pound of weight than the best steel. The metal wheel designer, therefore, must seek to compensate for this defect in his material by making the different parts of his wheel work together more perfectly to absorb shock than can be done in the wooden wheel, with its more or less imperfect connections.

Again, we would not be understood as claiming that the metal wheel alone is the wheel of the future. Something may well be accomplished, and indeed has been accomplished, in wheels of composite construction. If hickory fails, other woods, even though they may be less satisfactory, may be made to take its place. Other materials may perhaps also be utilized; in fact, the whole field is open to the inventive designer.

That it is not an entirely unworked field may be seen from the fact that in the U. S. Patent Office the subclasses of "Wheels" and "Spring Wheels," in the class of "Carriages and Wagons," contain nearly 800 patents, while an equal or greater number are in existence relating to wheels for railway rolling stock. Yet, notwithstanding the work of these prior inventors, there is still room for the design of a better and more satisfactory wheel than any yet developed.

FROM THE FOUR WINDS

HORSE OWNERS OBJECT

Cleveland, Dec. 10.—Horse owners in this city are endeavoring to place restrictions upon the use of steam vehicles on the city streets. While it is admitted that automobiles in general have equal rights with other vehicles, it is claimed that the clouds of exhaust steam arising from steam vehicles, especially on cold days, make the machines a source of great danger to those who drive horses. Several accidents have recently arisen from this cause, notably one which occurred to Gen. James Barnett, a prominent citizen, a few days ago. The general's horses became frightened at a steam vehicle and whirled around, overturning the carriage. Gen. Barnett and the driver were both thrown to the pavement and the latter, who is an old man, was severely bruised, so that he will be confined to his bed for some time. An unfortunate feature of the accident was the fact that the driver of the steam vehicle did not slacken speed and, it is said, paid no attention to the accident.

A FAST CENTURY RIDE

Philadelphia, Dec. 10.—C. G. Ridgway and George Ferrier, who left Brooklyn at 8 o'clock on last Friday morning on their De Dion-Bouton Motorette, arrived at the City Hall here at 2:30 in the afternoon, the run of 110 miles having consumed 6 hours 35 minutes. The distance from Newark to Philadelphia was made in 4 hours 35 minutes, including all stops. The roads were poor. Messrs. Ridgway and Ferrier spent the night here and started early the next morning for Washington. Not a single mishap marred the run from Gotham to this city.

PECULIAR "OATHINGS"

A specimen of the sort of evidence which the police consider good enough to secure convictions in alleged furious motor driving cases was recently heard at Diss, according to an English paper. One witness could not say how fast defendant was driving, as he "never saw only three such things in all his life. He had seen more'n one horse run away, and he never saw a horse driv' past him like as how the motor went. He did not know the speed, as the most he ever driv' was a donkey." Another witness said "he was mentally and physically upset." The case was dismissed, as well it might be after such very peculiar "oathing."

PASSING OF THE CANAL MULES

"The automobile is destined to become generally used within a few years to draw canal boats, I believe," said Captain W. Dolloff of Durhamville, an old boatman, at the state canal office, to the Syracuse Post-Standard representative. "Only the other day a 100-ton boat in Trenton, N. J., was drawn at the rate of three miles an hour by an automobile and the trip proved successful."

The conversation of the several boatmen who were in the office was upon the present conditions along the canal as compared with those of twenty and thirty years ago.

"Thirty years ago," said one, "the railroads and canal were able to compete on a fairly equal basis. Improvements have since come, but they have all been on the railroads. The canal to-day is just the same as when I first knew it. For the canal to continue as a factor in the commerce of the state it must have something done to it.

"There was more money in running boats along the canal several years ago than there is now. Then freights were higher, with no great difference in the expense of running, the toll gates being of no very great importance. Now competition has put freight rates way down and the business is altogether more uncertain.

"Many more boats are owned by the

captains now than formerly. Several companies at one time controlled a large number of boats on the canal, but now by far the greater number are owned by the captains. Several new boats have been put into commission this year.

"The total number of clearances at the local port for this season to date has reached 4,512. This is the largest number in several years and is 1,260 in excess of the clearances last season to date. The total number in 1899 amounted to 3,425 and in 1898 to 3,302.

"The local port has more clearances than any other along the canal with the exception of West Troy, which on account of its location is slightly in advance with 200 more.

"Freight rates, which were extremely low early in the summer and throughout the season, have advanced materially during the past few weeks. Wheat that was carried from Buffalo to New York at 2½ cents a bushel has now a freight rate of from 3¾ to 4 cents. Other rates have advanced in proportion.

"Two boat loads of salt from Syracuse to Albany yesterday brought to their owner $250 apiece for the trip, from which the expenses must, however, be deducted. A boat loaded with 8,000 bushels of potatoes from Rochester to Syracuse had freight charges of $400.

"This increase of freight rates has not meant a material increase in the revenue of the boats. At this time of the year a difficulty is found in securing west-bound freights, consequently the larger number of boats going west are light. Most of the boats now going through to New York are making their last trip of the season and will tie up at West Troy for the winter."

SURPRISED AT ITS QUIETNESS

An English automobilist sends to one of the English automobile papers the following story: "We (four friends and myself) had a great difficulty in getting a stable for our car in a little village bordering on Yorkshire and Durham. Ultimately, through the kindness of the station master, we got it in a shed adjoining his house. Next morning we called, and the station master's wife informed us in a surprised tone that it (the motor) had never moved all night. The station master informed us that his wife had not been able to sleep all night, expecting the motor to break out of the shed and career around the yard, and she was afraid it would come in collision with the house. Well, it's not gentlemanly to laugh at a lady, but we in an apologetic tone informed the good lady that we were not laughing; it was a peculiar kind of cough we had acquired through motoring." On another occasion they were asked if the car "githered," and on showing their ignorance of the meaning of the expression were treated to a severe shaking of the car by the stalwart interrogator, by way of demonstrating his meaning.

THE CIRCUS AUTOMOBILE

"There will be a revolution in the circus business next year," said Leon La Salle, who, during the summer months is manager of the rolling stock of one of the largest shows in the country, according to the Denver Post.

"One will no longer see the prancing steeds at the head of the band wagon. No, the horse has had his day as far as circus band wagons are concerned. Next season you will see our band wagons plying the streets of the large cities propelled by steam or gas.

"When the automobile was suggested to the manager of our show he was greatly pleased with the idea.

"Of course the show will not do away with the horse altogether for hauling purposes, as it is only the lighter cages that can be moved by steam. All of the large vehicles excepting the band wagons will still be hauled by horses. And the ring stock, of course, will be kept. You know you can't use an automobile for bareback purposes," said Mr. La Salle, laughingly.

"I believe our show has an order for several of these automobiles, which will be turned out this winter. The equipages will be made more beautiful than any wagon we have ever had. One who has not been in the business can hardl

imagine the vast amount of expense connected with an organization of this kind, or the large sums which will be saved by the use of automobiles. Thousands of dollars are annually spent by circuses in the care of their livestock. They eat tons and tons of feed, and an army of men are employed to care for them. With the automobile in general use, it will be different. A circus will need comparatively few horses, and can afford to buy a far better grade of stock.

"The army of grooms which were formerly necessary will give place to a few expert machinists, who will care for the rolling stock. The automatic wagons are much lighter and easier to move, besides being a decided novelty and a great advertisement.

"The circus automobile, I think, has come to stay."

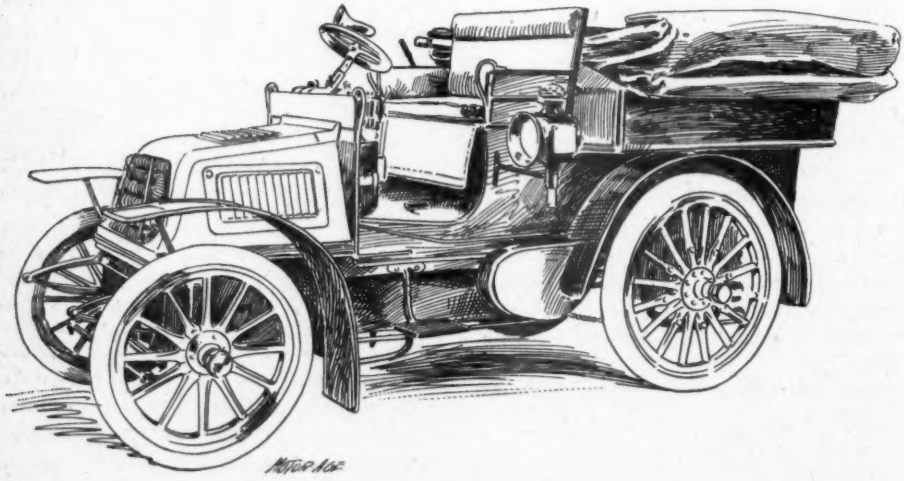
AUTOS AND ROADS

It may not be as difficult as has been supposed, says the St. Louis Post-Dispatch, to put our western roads in good order for the use of automobiles. This is because it has been found that the automobile can climb hills too steep for ordinary vehicles.

The automobile has two advantages in hill climbing. Its weight gives it a "grip" and its rubber tires enable it to maintain that grip and pass over obstacles that would block the progress of wheels with steel tires.

These advantages were shown in a striking way at Stamford, Conn., recently, where an automobile wagon, with a load of 5,000 pounds, easily climbed two of the steepest hills in the county, which were considered impassable with steel tires.

Hence, to make roads good enough for automobile traffic, deep cuts and expensive grades will not be necessary. Like the old Roman highways, our roads can pass over hills instead of going round or through them. This will give the passenger pleasant views and enable us to use the automobile at an earlier date than would otherwise have been possible.



TWELVE-HORSEPOWER DAIMLER MOTOR CAR, RECENTLY PURCHASED BY THE PRINCE OF WALES.

A FRIENDLY CHAT ABOUT AUTOS

INFORMATION GIVEN BY A MAN WHO KNEW HIS GROUND—VIRTUES AND LIMITATIONS OF THE HORSELESS VEHICLE—THE QUESTION OF COST AND MAINTENANCE DISCUSSED

The following extract from the Boston Herald, while decidedly elementary, for a considerable proportion of the readers of The Motor Age, still gives this elementary information in such chatty and entertaining form that it will not prove monotonous, even to the man educated in automobilism, who is also bound to gain some fresh ideas from its perusal, and will certainly prove interesting as well as instructive to those readers who are yet in the primer class of automobilism—the prospective purchasers and those who are just mastering their first automobile—among which class this paper has a considerable circulation. The Boston paper, which is to be congratulated on the manner in which it is educating the public says:

Ignorance of the Public

An automobile carriage was halted in Court Square, and the driver had disappeared, so that there was no one connected with it to satisfy the inquiries of the curious. It was not one of those great lumbering vehicles—stanhopes, they call them—but a trim, light and bright-looking carriage. People gathered around it to speculate as to what it was, and ask questions of one another in regard to it, no one, however, being able to answer the questions of another any more than he was able to draw information from his neighbor. The fact was that all the crowd knew about the thing was that it was an automobile, and would go without a horse being harnessed to it.

Differences of Opinion

Some thought it was a steam carriage, others that it was a gasolene affair, while others speculated that it was an electric carriage, though they could not see where there was room enough in it for storage batteries of sufficient capacity to carry it around for any length of time to any great distance.

While they were discussing the matter from the various not-knowing standpoints, an old gentleman stepped up to look at the carriage, and at the same time a man who looked like a machinist stopped to inspect its make and mechanism.

"It is an electric carriage," said the old man, "one of the pioneer forms of the coming road vehicle."

"Don't you think the electric form will be a permanent one?" asked the mechanic.

Discussing Electric Power

"I don't see how it can be," replied the old man. "The energy used in this way is too expensive to make the employment of it economical as against gas and steam, which give energy more directly from the sources under our control. To obtain power by electric energy there must be several conversions from the original sources—coal, oil and water power. With coal, we first produce steam, getting in that form only about seven or eight percent of the energy in the fuel. Then we convert that percentage of energy into electricity, obtaining about fifty or sixty percent of it. In charging the batteries we cannot succeed in storing more than sixty percent of the electric energy employed, though I admit that a higher percentage is claimed.

Much Energy Lost

"You will, therefore, understand that through electricity, whether from steam or water power, but a very small percentage of the coal energy is utilized through the storage battery. At the best it can never be an economical system of automobile propulsion, though it has some points of excellence which in other methods are lacking. It is comparatively noiseless, and save for the slopping over of the cells is not objectionable. Even in this latter respect

I see that an inventor has succeeded in making a jelly-electrolyte that will not spill and is just as efficient as the liquid."

"What do you mean by electrolyte? I do not understand many of the technical terms used in electricity."

About Storage Batteries

"Storage battery plates are made of sheet lead, which is coated with an oxide of lead. These plates are placed in cells of glass or rubber, and are coupled so as to be positive and negative in action, one being necessary to the action of the other. These plates are separated in the battery jar, and when put in place a solution of sulphuric acid is poured in until their surfaces are covered. Then a current of electricity is turned into the plates, and a chemical action between the acid, which is the electrolyte, and the peroxide of lead on the plates is produced, until the plates are fully charged. They are then in the condition of a primary battery where the zinc and carbon elements are acted upon by the electrolyte —acid or alkaline—and the energy stored in the metal in its reduction from the ore by heat is released, and utilized in the form of electric energy, only this form of conversion is not anything like so potent or powerful as that derived from the storage battery, which can by a multiplication of the cells be made to deliver a heavy current of high potential."

In the Pioneer Stage

"I think I comprehend you, and can understand why the electric current is so expensive to use. But if gas or oil—I understand both are used in automobiles—are so much cheaper than electricity, why use this form of energy?"

"This whole matter of motor carriages is in the pioneer stage, so to speak. That is, there is nothing as yet fully fixed and complete in it. Electricity, though the more costly, is the least objectionable, because it gives less trouble in stopping, starting and slowing down, though these are practically matters of mechanical regulation and adjustment, which could be applied in the case of any other form of motive power. But in the use of steam, gasolene and oil, there are certain drawbacks which have not as yet been fully overcome, though I am confident they will be in the near future, for the motor carriage, in my opinion, is the carriage of the future."

Attracts Attention

A group of people had by this time gathered, and listened with interest to the talk of the old man. The driver of the electric vehicle now made his appearance, and, mounting his seat, released the lever and started the carriage, which glided off silently and gracefully. The old man continued:

The Future City

"You can see from that carriage how easy and gentle electric or mechanical traction is compared with animal traction. On this asphalt pavement the heaviest loads can be carried noiselessly and without one-quarter of the wear and tear incident to animal traction. And then think of what our city will gain not only in the matter of noise of the present team traffic, but in cleanliness, the absence of horses from the streets insuring greater cleanliness and better sanitary conditions. On every dry, windy day a considerable proportion of dust blown into our faces and clothes, and of the air which is taken into our lungs, is composed of animal excrement. I do not expect to live to see it, but I am confident the time will come when all the team traffic in our streets will be done by motor vehicles, and the driving of horses within certain prescribed limits will be forbidden by city ordinance."

Love of the Horse

"Well, that may be, but I must say I like the horse, and I do not favor his extinction."

"Neither do I. I was brought up on a farm, where horses were indispensable, and I do not see where their usefulness can be dispensed with in the country in the future. In some operations they will always be of use; but much of their usefulness even on the farm may be superseded by mechanical power. I notice that farmers in Germany are utilizing the electric current—derived from water power as well as

steam power—to plough their lands and do other farm work. My sympathy for the horse would lead me to rejoice in any change that would remove some of the drudgery he is now subject to. Who regrets the substitution of electric for animal traction on our street railways?

A Matter for Rejoicing

"It is rather a matter for rejoicing, when we recall the terrible sufferings of the poor horses in the hot season of summer, and if you can remember when omnibuses ran on Washington Street, how often the poor horses dropped dead harnessed to them under the July and August heats, how merciful the change even to the horse car system seemed. I tell you, my friend, the world is moving, even if we have to move off it in the not distant future."

Winter Difficulties

"There is one thing," said the mechanic, "which I regard as a great difficulty in the way of permanently employing mechanical traction instead of horse power. In winter, during our heavy snow storms, how is the motor vehicle to make its way through the deep snow and drifts?"

"That, on the face of it," replied the old man, "appears to be a practical objection to the use of horseless carriages in the winter season. It at first appeared to me to be a fatal one to the use of these vehicles on snow streets and roads; but a little reflection, and witnessing for the past two or three winters the perigrinations of motor carriages through snowy streets, have convinced me that such natural obstructions will not be fatal to the new carriages. They have gone through snowy streets with equal, if not better, facility than horse-drawn wheeled vehicles.

Misgivings About the Trolley

"You will remember that when the change was made to electricity on our street car lines there was a good deal of misgiving as to the running of these cars in winter, but as a matter of experience the companies have handled the snow much better with electric than with horse power. Then you will remember that our heaviest snow storms rarely block our streets longer than a day or two at the worst. Besides, experience shows that where obstacles are necessary to be overcome, the inventive ingenuity of man may be reckoned on to devise the means to the end. It has always been so, and always will be so."

Heavy Trucking Problem

"I suppose you are right, sir, and I hope you are. I agree with you that a change from animal to mechanical power in our street traffic is most desirable; but how are we to transport heavy loads on such spindle-spoked wheels as they seem to favor for the motor carriages?"

"That part of the problem is very easily solved. With the mechanically operated vehicle it is only a question of strength of axles and wheels, and of power of motor. It would be as easy and as simple a matter to operate a carriage having fifteen or twenty horsepower motors as it would be to operate one of five horsepower, and over an asphalted street with hard rubber tired wheels, it would make no more noise than the smaller vehicle."

The Matter of Expense

"But wouldn't that be more expensive than horses?"

"It would not be necessary to employ the whole strength of motors, except on heavy grades, and, let us say electricity is the power employed, the expenditure of the current would be only in proportion to the work done. Besides, the improved system of double ball bearings, which reduces friction in the journals to a minimum would make the expenditure of energy in heavy carriage traction comparatively small. But there are cheaper methods of carriage propulsion than that of electricity."

"But is electrical traction with storage batteries as cheap as animal traction?"

Great Saving in Sight

"When Mr. Henry M. Whitney changed the system of traction on the West End railway from horses to electric power there were grave doubts as to the economy of the measure, however desirable the change might be. But even then, in the comparatively undeveloped state of electric distribution and generation and motor efficiency, the change proved the great economy of electric over horse

traction. It was at once realized that the saving in power operation by this change was from twenty-five to fifty per-cent over that of horse traction. Now, with greatly improved systems of generation, distribution and utilization of electric power, the saving is so great that I doubt if the companies using the system would care to state exactly what it is. In my opinion, it does not cost one-quarter as much to operate street cars by electric power as it would if horses were employed. Then consider the size of the cars employed in the service to-day. It would be impossible to operate them by horse power. The public, in having such large, roomy and easy riding cars to ride in, have been the great gainers by the change. Also in the matter of speed, consider the great improvement of the present over the old system."

Cost of Transmitting Power

"I am aware of that, but while the employment of electric power in street cars may be cheaper than horses, is it not owing to their method of power distribution, by which they can take the current direct from the wires wherever they may be on the lines? Does the comparison hold equally good in the case of electric carriages?"

"The cost of an overhead electric system, my friend, is very great, and its maintenance is a source of continuous outlay. The placing of the feeding wires underground has cost what would be a large fortune even in these days of crops of millionaires. There is a good deal to this subject which I will not now discuss.

Loss in Batteries

"But, as we are on the subject of street carriages, I would say that while the cost of electricity, by storage batteries, to operate them would be greater proportionately than if they could, like the railway cars, take the current from the wire, it would still be much less than the cost of horse power. In estimating the cost of horse power, we must take into consideration the maintenance of stables to house them, food to nou them, hostlers to care for them, drivers to drive them, and then there is the wear and tear and deterioration in value of the animals, their liability to disease and accident. Taking all these things into account, it appears to me that electric carriage traction must be as much more economical as it is desirable.

As to Maintenance

"As to the first cost of an electric carriage outfit, it is not so greatly in advance of that of a corresponding horse-carriage. The carriage and equipment for automobile purposes might cost say from $800 to $1,000. A like horse-carriage would cost from $300 to $400; and the horse and harness say from $200 to $250—not so great a difference in first cost, you can see. But here will come the economy of the electric machine. The horse has to be fed, whether he is used or not. The electric carriage expends energy only when it is in use. If it is charged to run fifty miles a day, and is employed to run only ten miles, it is good for five days' service of a like kind.

Automobile Maintenance

"I am aware that the battery plates of accumulators lose a certain amount of electricity even when not in use; but where constant employment is given there is not much chance of waste of current. The plates of the batteries also give out after a time, but their renewal is not expensive—certainly not an item of expense so great as to add largely to the cost of operating electric carriages. You will understand that in this instance I am speaking of a one horse carriage. Where two horses are needed—as in our hotel hacks, etc.—the first cost would be more nearly equal, while the cost of maintenance would be very largely in favor of the electrically propelled vehicle."

No Delays Necessary

"But is there not considerable delay in recharging the batteries?"

"None whatever. Two sets of accumulator cells should be owned in an outfit—one to be placed in the generating situation to be charged while the other is in use. Or if only one set of cells is used, the plates can be charged at night, and be ready for use in the morning. No, there need be no delay. The change

of batteries can be made in five minutes —that is, the discharged cells can be disconnected and taken out, and charged ones put in and connected in that time. The work is simple, and can be quickly done."

COMPOUNDING GAS ENGINES

This problem has occupied much attention and has baffled many earnest experimenters, but it is such an attractive subject and the rewards for its solution are so tempting that the question continues to command the attention of the ablest engineers engaged in this industry in spite of repeated failures, says Modern Machinery. It is not at all surprising then that among the less eminent workers there should be a constant inquiry as to the practicability of compounding gas engines. This will be better understood, too, when we consider the conditions that obtain to-day.

In the modern internal combustion engine, from forty to sixty percent of the heat units are accounted for in the exhaust, the pressure of which at release is from forty to fifty pounds absolute, and the temperature from 1,000 to 1,200 degrees Fahrenheit. As the efficiency of a heat engine depends on the ratio of the initial temperature minus the terminal temperature to the intial temperature, an increase in efficiency, when other conditions are the same, will necessitate release of the gases at as low a temperature as possible, and to secure such results a greater expansion of the burning charge is necessary. Atkinson secured with his differential engine a greater expansion than is ordinarily obtained in the modern gas engine, which proved that efficiency increased as the terminal pressure was reduced; yet, from a mechanical standpoint, his engine was a complete failure.

The object, then, in compounding, is to get work out of the exhaust, increase the efficiency and incidentally annihilate the "bark." Inventors and engineers recognize the requirements of an increased efficiency, and many think that compounding is the only way to accomplish such results. At least one expert declares that a complete expansion can be obtained in a single cylinder engine, but we are not at liberty at the present time to describe the results which he has already obtained, nor indicate the commercial and other advantages which this experience seems to anticipate. In the present article it is our purpose to discuss the subject of compounding both in theory and practice. The contributions presented give the views of three eminent experts, and it must be admitted that the preponderance of evidence is against the feasibility of the plan.

Mr. Roberts alone contends for practicability of compounding, and he declares that a gain of twenty percent is not too much to expect from a well designed engine of this class, and "possibly even a higher amount." He admits, however, that the experience of builders has been rather discouraging, but an explanation is offered in the fact that these experiments have always been abandoned practically at the outset, and the question has, therefore, never been thoroughly considered. His own experience has given him many well defined ideas upon the design of an engine of this type. He advocates the use of two high pressure cylinders, where the low pressure cylinder is single-acting, in order that the low pressure cylinder may have no idle strokes. The arrangement suggested, however, introduces a difficulty which will require serious thought, as it involves the designing of a special valve which will serve as the outlet valve for the low pressure cylinder and the exhaust valve for the high pressure

cylinder. Mr. Roberts confines himself to a mathematical investigation of the subject, and it must be admitted that he presents an attractive and plausible argument in favor of compounding.

On the other hand, Prof. Kerr and Mr. Sargent are inclined to believe that from the very nature of things the successful compounding of gas engines is impracticable, and the reasons they advance will find favor with most of those who have had practical experience along these lines.

As might be expected, Prof. Kerr of Armour Institute of Technology contributes a very conservative opinion on the subject. The conditions which favor the actual gain in the compounding of steam engines, it is shown, do not obtain in the gas engine. The problem of condensation, which is such a prominent factor in steam engine design, does not enter into the calculations of the gas engine builder at all, and any gain from compounding would have to come from expanding in two or more cylinders to a lower terminal pressure than is possible in one cylinder with final atmospheric exhaust. There would be lost work, too, it is pointed out, in transferring gas from one cylinder to the other and additional friction loss on extra moving parts. In considering the question of lubrication, Prof. Kerr expresses the opinion that greater trouble would be experienced in lubricating the high pressure cylinder and less trouble in the low, but the one cannot be said to offset the other, as the higher temperature of the high pressure cylinder might prevent lubrication, and this, of course, would prove a vital failing.

C. E. Sargent, who has given the subject of increasing the efficiency of gas engines several years' careful investigation and study, is very decided in his view that it is wholly unnecessary and utterly impracticable to compound in order to get the best results. He points out that if steam were a permanent gas, there would be no cylinder condensation, and if there were no cylinder condensation a single cylinder steam engine with the same initial pressure and the same number of expansions would give just as good thermal efficiency and better mechanical efficiency than any compound triple or quadruple expansion steam engine. The conditions and controlling factors in gas engine practice are diametrically opposite to those considered in the design of steam engines. There is a permanent gas and there is no cylinder condensation, and, consequently, the principal object in compounding would be to reduce the terminal pressure and temperature and turn more of the heat into work instead of wasting it. The question arises whether these obstacles cannot be overcome in a simpler and easier manner, as it has been shown that while with compound engines a lower terminal pressure and a higher efficiency have been obtained, the additional cost and increased complications have more than offset the advantages. An example of this kind is mentioned by Mr. Sargent, and others could undoubtedly be recalled by any one familiar with the work that has been done along these lines. Mr. Sargent's experience leads him to believe that on account of the complications which would necessarily arise, and in view of the fact that, as he asserts, all the advantages claimed for the compound engine may be obtained in a better and simpler manner, compounding will never be commercially successful as applied to gas or gasolene engines.

NEWS OF THE MOTOR INDUSTRY

CAUSED BY INTERNAL DISSENSIONS

A series of internal dissensions in the directory of the Cycle Age Company, publishers of Cycle Age and Motor Age, culminated Tuesday of this week in an attempt to wreck the company by an application to have it declared bankrupt.

The case came before Judge Kohlsaat in the United States District Court on Wednesday and was promptly dismissed, the petitioners failing to show any foundation for their complaint.

The answer of the company showed a condition far from insolvency and the prompt action of the court met with the approval of the people with whom the company transacts business, ninety per cent of whom certified to the strength of its financial position and to their complete confidence in the present management. They joined in an expression of disapproval of the proceedings and petitioned the court to dismiss them.

We make this explanation promptly to prevent any misapprehension and that our friends may know that ill will and not financial difficulty was involved in the case.

ALLOTMENT OF SPACE

On Saturday of this week the management of Motor Age will make the first allotment of spaces for the automobile show at the Coliseum, Chicago, March 23-30. The applications received up to Tuesday cover considerably more than one-half of the building and include the following makers:

Badger Brass Co., Kenosha, Wis.
Baldwin Auto Mfg. Co., Connellsville, Pa.
Borbein, H. F. & Co., St. Louis.
Century Motor Vehicle Co., Syracuse.
Eastman Automobile Co., Cleveland.
Grant Bros., Orange, Mass.
Gray & Davis, Amesbury, Mas.
Haynes-Apperson Co., Kokomo, Ind.
Milwaukee Automobile Co., Milwaukee
Moffett Vehicle Bearing Co., Chicago.
Muller, H. C., Milwaukee.
Munger Vehicle Tire Co., New Brunswick, N. J.
National Auto and Electric Co., Indianapolis.
Olds Motor Works, Detroit.
Overman Automobile Co., Chicopee, Mass.
Remington Automobile Motor Co., Ilion, N. Y.
Scott & Cooper Mfg. Co., St. Louis.
Temple, Ralph, Chicago.
Thomas Motor Co., Buffalo.
Waltham Mfg. Co., Waltham, Mass.
Winton Motor Carriage Co., Cleveland.

Requests for information indicate that a number of others will be on file before Saturday. The space remaining after that day will be allotted as quickly as applications are received. The list of allotments will be forwarded to the press on Monday next.

AUTOMOBILE SERVICE IN MEXICO

As previously noted in The Motor Age, the Electric Vehicle Co. organized, some time ago, a subsidiary company in the city of Mexico. This company is known as the Compania Mexicana de Vehiculos Electricos. The accompanying photograph has been furnished by this company, and shows one of the omnibuses in regular service in that city:

The Mexican Herald, a paper printed in English, has the following to say concerning the excellent service of these vehicles:

"The new automobile omnibus service, between the National Palace and the Statue of Carlos IV., was subjected to a severe test on Saturday and Sunday last, when the street of Plateros and San Francisco were crowded to their utmost capacity with people on foot and vehicles of all kinds. The new service must be given credit for having kept up a service of frequent and regular trips during all that portion of the day when vehicles were permitted on the streets named. Every omnibus was filled to its utmost capacity, and, in spite of the immense crowd, thousands of people were transported from one end of the route to

the other, not only pleasure seekers who were viewing the illuminations, but people who wished to go to and from their homes. Not one accident took place during either of the two days, thus giving a practical demonstration that the automobile is the most easily managed of any public vehicle in use.

"The omnibuses presented a gay appearance draped with the national colors, and on Saturday night they were illuminated by red, white and green electric lamps, which added to the festive appearance of the streets.

"The extension of this excellent service through other important streets of the city may be expected when the sewerage repairs are finished and the new asphalt pavements are laid."

The same paper also says, editorially, that wealthy young Mexican gentlemen of the aristocratic circle are buying automobile carriages, and adds that the new vehicle has the prestige of fashion and good form.

AUTO BUS SERVICE IN MEXICO CITY

PHILADELPHIA SHOW PROGRESS

Philadelphia, Dec. 10.—On last Friday night a joint meeting of the Automobile Club of Philadelphia and the Pennsylvania Automobile Club was held for the purpose of naming committees to co-operate with the promoters of the automobile show which is to be held in this city during the first week of February next. The first-named organization will be represented by its secretary, Frank C. Lewin, John L. Wilson and J. S. Muckle. The Philadelphia Automobile Club selected as its representatives William F. Rudolph, Charles L. Klander and Leon Goodman. These gentlemen will meet weekly at the show headquarters, 138

North Broad Street, to perfect the plans for the social and sporting features of the exhibition.

But few of the spaces remain, and long before the date of the opening every available inch of exhibition floor will have been sold. The showing to be made by the large concerns especially will, judging from the amount of space taken by the majority of them, equal in every respect their showing at the Madison Square Garden show. H. D. Le Cato has been sent by the promoters to Washington, where he will glean any new ideas or novelties which may prove attractive at the Philadelphia show.

ENTIRELY PRACTICAL

"The accompanying illustration," writes C. E. Duryea, of the Duryea Power Co., "explains itself. It is intended to relieve the motor vehicle industry of that feeling of disfavor in which it has been held by certain persons —according to the jokers, at least. These vehicles can easily be controlled by the outside hand, as shown, in which position the operator gets a very powerful control of the steering, and can, of course, use both hands if occasion requires, which is very seldom."

CONSTRUCTION OF COOLING TUBES

The value of water cooling tubes for gasolene motor vehicles is thoroughly appreciated on the other side of the Atlantic, where there are a number of firms, selling these tubes to manufacturers, and is appreciated in a somewhat less degree here in the United States.

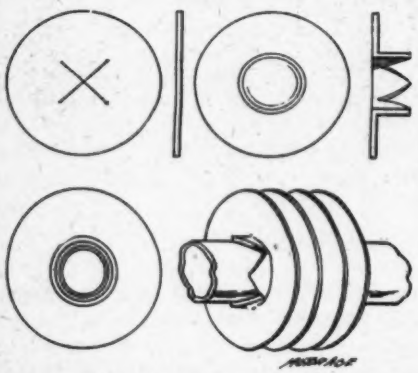
DURYEA'S "IMPROVED" VEHICLE.

These tubes, however, are applicable to steam as well as to gasolene vehicles, acting, in the former case, in the capacity of condensers. A few words, therefore, on their construction will not be out of place.

The size and gauge of the tubing used, as well as the length, will depend on the purposes to which it is put. These figures being determined, it is necessary

to punch out a quantity of discs of a diameter about three times that of the tubing. This done, the discs should be punched with two transverse slots, as shown in the upper left hand illustration, leaving four inwardly projecting ears. The slotted discs must then be stamped so that the ears will take the positions shown in the upper right hand illustrations. It is necessary, of course, that the resultant circular hole should be of just sufficient diameter to fit snugly over the tubing. Then the discs are strung on the tubing in the manner shown in the lower illustrations, and brazed in place. Copper should be used, as it will radiate the heat more quickly than any other of the common metals. Care should be taken in brazing, not to use too much spelter, as it will interfere with the radiation of the heat.

The radiating tubes can be made in sections of convenient length, in the manner described and the sections then connected together in whatever manner the constructor may determine. It is best, however, to have the tubes at the fore part of the vehicle where they will receive the full benefit of the rush of air.



In any event, they should be so arranged that the tubing itself will lie transversely of the vehicle so that the radiating flanges will lie in longitudinal planes and will be exposed to the circulation of the air without interference from each other.

OAKMAN CO. SOLD OUT

The Oakman Motor Vehicle Co. of Greenfield, Mass., has been sold out to the American Vehicle Co. of New York City, makers of gasolene, steam and electric vehicles. The Oakman company has been understood to be in financial difficulties for some time past.

DE DION-BOUTON PROGRESS

The De Dion-Bouton Motorette Co., Church Lane and Thirty-seventh Street, Brooklyn, N. Y., is one of the most energetic automobile manufacturing concerns in the country, and their constantly increasing number of different types rivals the variety offered by the electric vehicle concerns.

The New De Dion-Bouton Surrey.

At the Madison Square Garden show in New York the De Dion doctor's coupe attracted general attention. It is a seasonable vehicle, being enclosed, and entirely protects its occupants from the elements. A coupe somewhat similar to this model is now going through the De Dion works, but it has a dinkey seat in addition, and is somewhat heavier. A hansom cab is also under construction at the present moment. An especial advantage of the De Dion is that any vehicle body may be fitted to the standard running gear. Thus one may have an enclosed carriage for winter use, and a light airy pleasure vehicle when spring brings with it the fair weather.

A late model is the surrey, shown herewith, and this vehicle seems especially adapted to family requirements, especially if fitted with the new 5-horsepower motor.

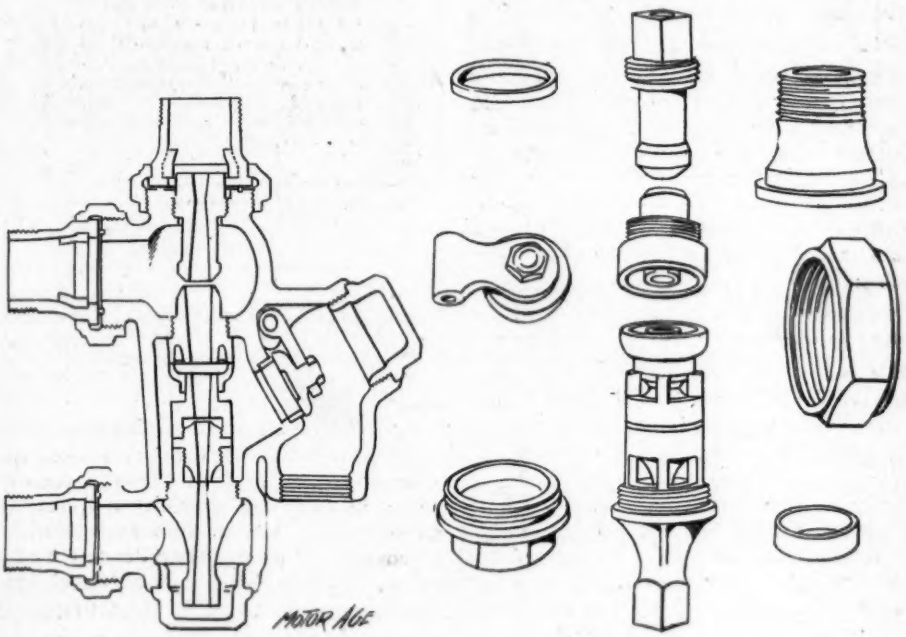
The 5-horsepower motor is the latest De Dion production, and it is stated that a lot is now on the way to this country, so that the De Dion people will soon

be able to supply the new motor from stock, just as they are now equipped to supply the 3½-horsepower motor.

The company reports that there is developing a call for a light powerful motor for launch requirements. The De Dion motor is especially fitted for this purpose, being a very powerful machine for its size and weight.

A NEW AUTOMATIC INJECTOR

The accompanying cut shows a cross section and details of an injector for feeding stationary, marine or portable boilers, which has been just put on the market by the Lunkenheimer Co. of Cincinnati. In its general design it resembles the well-known "Penberthy" injector, but it has been planned with an especial aim to reduce wear, facilitate repairs and secure maximum range. The body of the injector is of cast iron, thus insuring stiffness, and holding the tubes exactly in line. It sometimes happens with light brass body injectors that the strain of the pipe connections will badly spring the injector body. The various parts are screwed solidly to place and do not depend on pipe unions to secure them. The spillways are arranged in the connection pieces between the parts and drilled spillholes are thus eliminated. The overflow valve has a renewable disk resting against a renewable seat. The steam tube and the combining and delivery tube have each square end projections, so that they can be removed with any monkey wrench. It is said that with steam pressures of 60 to 100 pounds, and water not more than 75 degrees, the capacity of the injector can be varied more than one-half.



LUNKENHEIMER NEW AUTOMATIC INJECTOR

LEFT IN A PREDICAMENT

The following proves how cautious business men should be in handling the motor vehicles, says the Fahrader Export. The Zuricher Patent Motorenfabrik "Rapid" a few days ago stopped payment, to the sudden and unexpected detriment of the firm Alfred Hupfeld of Cassel. The latter firm, who, in common with all other wholesalers of our branch have, the last few years, experienced great losses in the cycle whole-

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IS a permanent exposition for the purpose of putting inventors in touch with the right capitalists and the right manufacturers. To sell and place patents on royalty all the facilities of a thorough business system in connection with an exhibition of models and drawings are employed. The Hall of Inventions takes care of everything connected with the introduction of an invention. Full particulars free. Visited by thousands daily. Models exhibited for $1 00 monthly. Send $1.00 and model prepaid.

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sale trade, had, during the course of the present year, undertaken the sole agency for Germany for the horseless vehicles of the above bankrupt firm. He was, moreover, obliged to pay 10,000 francs on the final contract, in order to acquire the sole agency for Germany, at the same time, Mr. H. was obliged to pay cash down for every vehicle he had of the firm, and that too in advance, conformable to the usual terms of payment, 100 francs only being allowed on each carriage. In the course of time, Mr. H. succeeded in selling a corresponding number of the vehicles, which were shipped to various points of the compass and for which the firm of Alfred Hupfeld were required by their customers to afford the customary guarantee for construction and material. The natural consequence has been, to plunge the firm in law-suits, which they had not dreamed of, owing to the fact of almost all the purchasers of the automobiles in question suing for restitution of the guarantee before expiration of the latter. Such claims are all the more likely to be decided against the Cassel firm from the fact of their being eo ipso excluded from obtaining any redress from the Zurich factory. Although we cannot help sincerely regretting the loss thus suffered by the firm of Alfred Hupfeld, we cannot fail to point to this instance as a warning for other dealers to profit by, namely, by giving their orders to a well established factory only and by taking pains to choose a good substantial firm, when wishing to obtain an agency. In fact, no one should allow himself to be persuaded, however brilliant the offer and profits held out may be, to engage in pushing an unknown article and, what is still worse, a motor vehicle.

The St. Louis Automobile & Supply Co. have lately sold a gasolene trap to go to central Mexico. It is designed to make a 150-mile run, climb all grades and average fourteen to fifteen miles per hour. It will be shod with steel

tires. The vehicle is just finished and has been thoroughly tested and will come above the specifications.

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FOR SALE—The Automobile Storage and Repair Co., 57 West 66th St., New York, have new and second-hand steam, gasolene, and electric carriages constantly on hand and have always some special bargains.

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A LITTLE WONDER!

This cut one-half size of

Our New Carburettor

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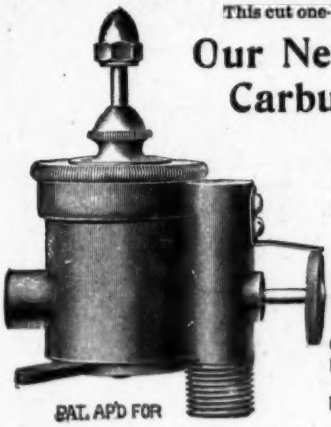
Mixing Valve



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It uses very little gasoline, and does not require hot air, is operated by gravity feed and always cool. It is thought there is a great field for a compact carburettor like this and preparations are being made to take care of the demand which will follow the placing of it before users.

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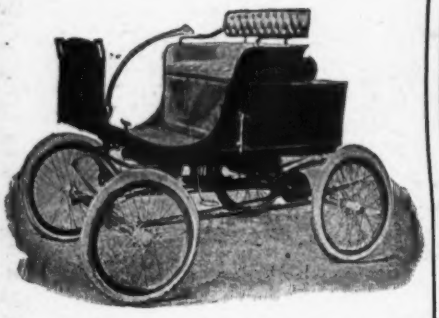

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Stanhope $750, Surrey $900
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Standard Carriage makes 2 minutes.
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Are detachable, double tube tires. An occasional puncture is inevitable in any tire. Any one can repair a G & J Automobile Tire easily and permanently. : :

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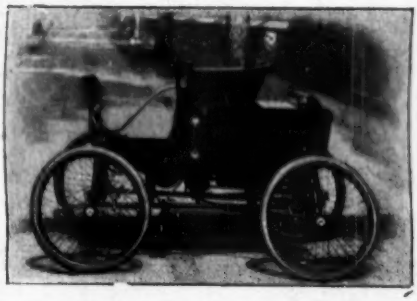
Don't wait until Spring
Early orders mean prompt delivery

Factories have to plan their outputs in advance. We are now delivering but will only accept agencies whose orders we will be able to fill when the rush is on. To increase our output we must be prepared early.



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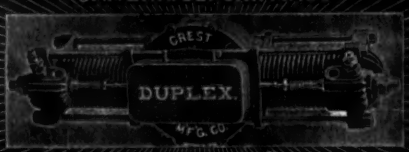

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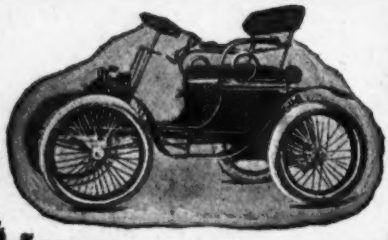

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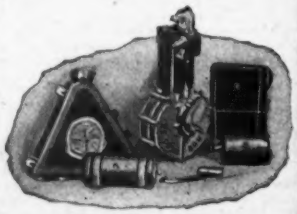

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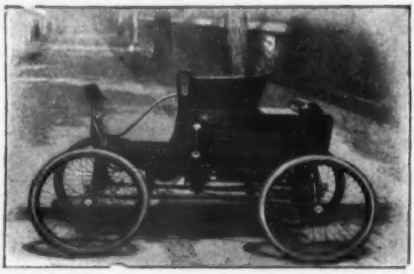

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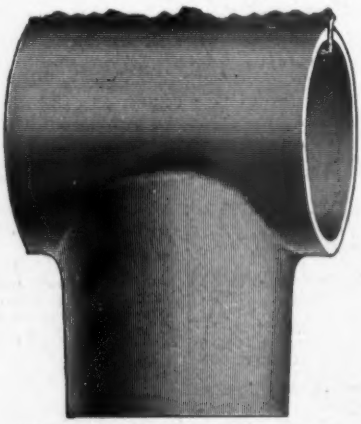

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